

Enhancing the performance of combined Shewhart-EWMA charts

Abstract

The combination of Shewhart control charts and an exponentially weighted moving average (EWMA) control charts to simultaneously monitor shifts in the mean output of a production process has proven very effective in handling both small and large shifts. To improve the sensitivity of the control chart to detect off-target processes, we propose a combined Shewhart-EWMA (CSEWMA) control chart for monitoring mean output using a more structured sampling technique, i.e. ranked set sampling (RSS) instead of the traditional simple random sampling. We evaluated the performance of the proposed charts in terms of different run length (RL) properties including average RL, standard deviation of the RL, and percentile of the RL. Comparisons of these charts with some existing control charts designed for monitoring small, large, or both shifts revealed that the RSS-based CSEWMA charts are more sensitive and offer better protection against all types of shifts than other schemes considered in this study.